



Approval

TFT LCD Approval Specification

MODEL NO.: N133I5 - L01

Customer: Dell

Approved by:

Note:

記錄	工作	審核	角色	投票
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**Approval****REVISION HISTORY**

Version	Date	Page (New)	Section	Description
2.0	Oct. 26. '07	All	All	Approval Specification was first issued.



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1 GENERAL DESCRIPTION

1.1 OVERVIEW

N133I5 - L01 is a 13.3" TFT Liquid Crystal Display module with LED Backlight unit and 40 pins LVDS interface. This module supports 1280 x 800 WXGA mode and can display 262,144 colors. The optimum viewing angle is at 6 o'clock direction. The converter module for Backlight is built in.

1.2 FEATURES

- Thin and Light Weight
- WXGA (1280 x 800 pixels) resolution
- 3.3V LVDS (Low Voltage Differential Signaling) interface with 1 pixel/clock
- RoHS compliance

1.3 APPLICATION

- TFT LCD Notebook

1.4 GENERAL SPECIFICATIONS

Item	Specification	Unit	Note
Active Area	286.08 (H) x 178.8 (V)	mm	
Bezel Opening Area (Polarizer Size)	289.5 (H) x 182.2 (V)	mm	(1)
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1280 x R.G.B. x 800	pixel	-
Pixel Pitch	0.2235 (H) x 0.2235 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	262,144	color	-
Transmissive Mode	Normally white	-	-
Surface Treatment	Glare, 3H	-	-

1.5 MECHANICAL SPECIFICATIONS

Item	Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	295.5	296.0	mm	(1)
	Horizontal(H, with Bracket)	303.5	304.0	mm	
	Vertical(V)	191.5	192.0	mm	
	Vertical(V, with PCB)	202.0	202.5	mm	
	Depth(D / top side)	---	---	mm	
	Depth(D / bottom side)	---	3.67	mm	
Weight	---	235	245	g	

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions

2 ABSOLUTE MAXIMUM RATINGS

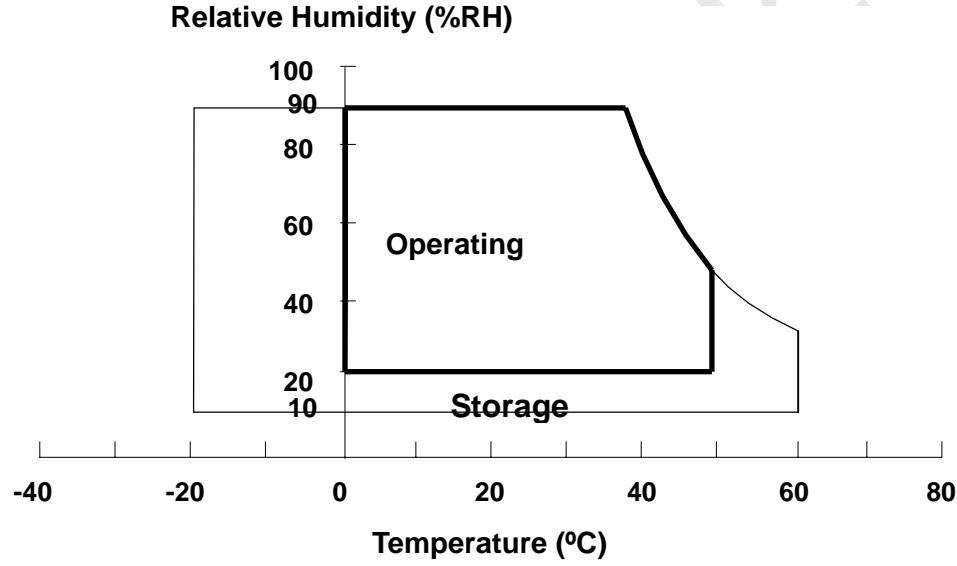
2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	°C	(1)
Operating Ambient Temperature	T_{OP}	0	+50	°C	(1), (2)
Packing Drop (Non-Operating)	PD_{NOP}	-	ISTA Standard	cm	(3)
Packing Vibration (Non-Operating)	PV_{NOP}	-	1.14	Grms	(4)

Note (1) Temperature and relative humidity range is shown in the figure below.

- (a) 90 %RH Max. ($T_a = 40$ °C).
- (b) Wet-bulb temperature should be 39 °C Max. ($T_a > 40$ °C).
- (c) No condensation.

Note (2) The ambient temperature means the temperature of panel surface.



Note (3) Follow ISTA standard: Drop 1 corner, 3 sides, 6 faces, each one for 1 time.

Note (4) Follow ISTA standard: 1.14Grms Random frequency 1~200Hz, 30min/Bottom, 10min/Top, 10min/Right-Left, 10min/Front-Back.

The fixing condition is shown as item 9. PACKING:

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2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V_{CC}	-0.3	+4.0	V	
Logic Input Voltage	V_{IN}	-0.3	$V_{CC}+0.3$	V	(1)

3 ELECTRICAL CHARACTERISTICS

3.1 TFT LCD MODULE

$T_a = 25 \pm 2 ^\circ C$

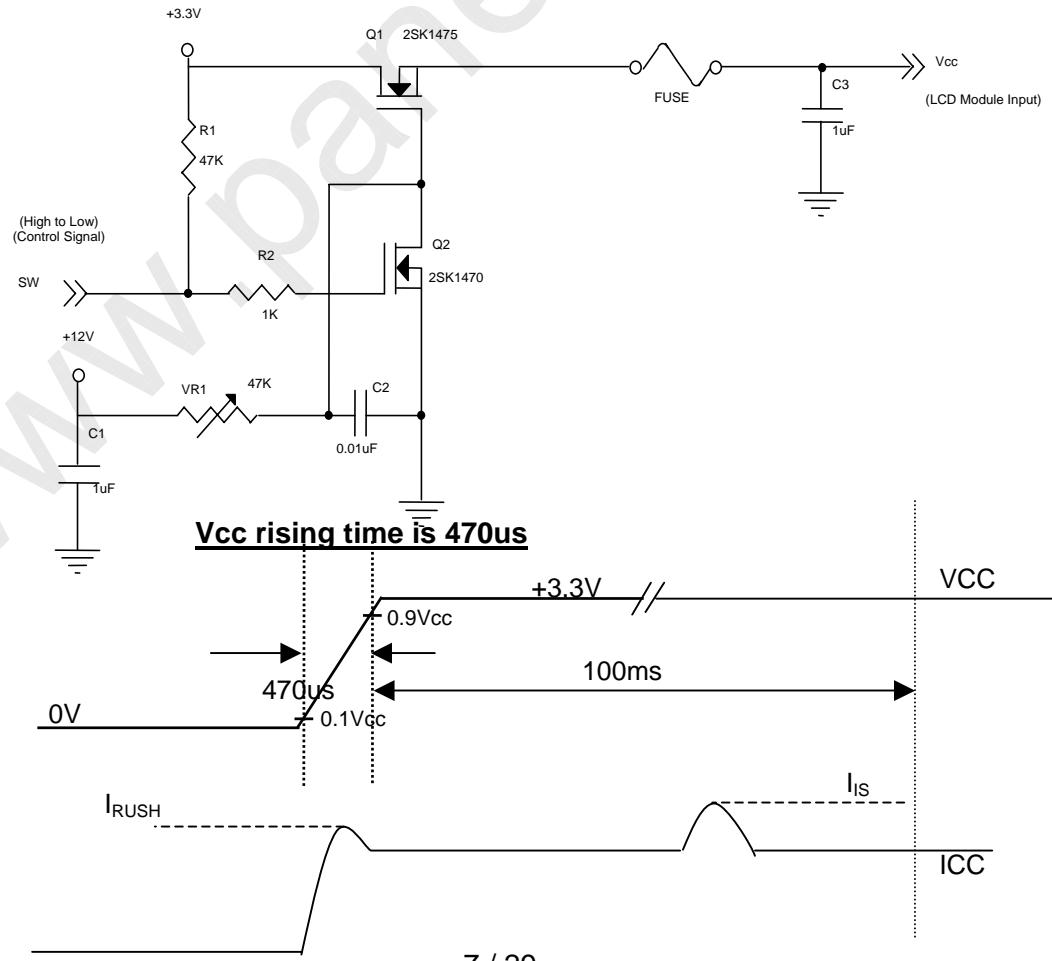
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	V _{CC}	3.0	3.3	3.6	V	-
Permissive Ripple Voltage	V _{RP}		50		mV	-
Rush Current	I _{RUSH}			1.5	A	(2)
Initial Stage Current	I _{IS}			1.0	A	(2)
Power Supply Current	I _{CC}		364	400	mA	(3)a
			424	460	mA	(3)b
LVDS Differential Input High Threshold	V _{TH(LVDS)}			+100	mV	(5), V _{CM} =1.2V
LVDS Differential Input Low Threshold	V _{TL(LVDS)}	-100			mV	(5) V _{CM} =1.2V
LVDS Common Mode Voltage	V _{CM}	1.125		1.375	V	(5)
LVDS Differential Input Voltage	V _{ID}	100		600	mV	(5)
Terminating Resistor	R _T		100		Ohm	
Power per EBL WG	P _{EBL}	-	1.32	-	W	(4)
LED Power Supply	V _{BL+}	7	12	21	V	
LED Power Current	I _{BL}		500	581	mA	
			167	194	mA	

Note (1) The ambient temperature is $T_a = 25 \pm 2 ^\circ C$.

Note (2) I_{RUSH}: the maximum current when V_{CC} is rising

I_{IS}: the maximum current of the first 100ms after power-on

Measurement Conditions: Shown as the following figure. Test pattern: black



Note (3) The specified power supply current is under the conditions at $V_{cc} = 3.3$ V, $T_a = 25 \pm 2$ °C, DC Current and $f_v = 60$ Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern



Active Area

b. Black Pattern

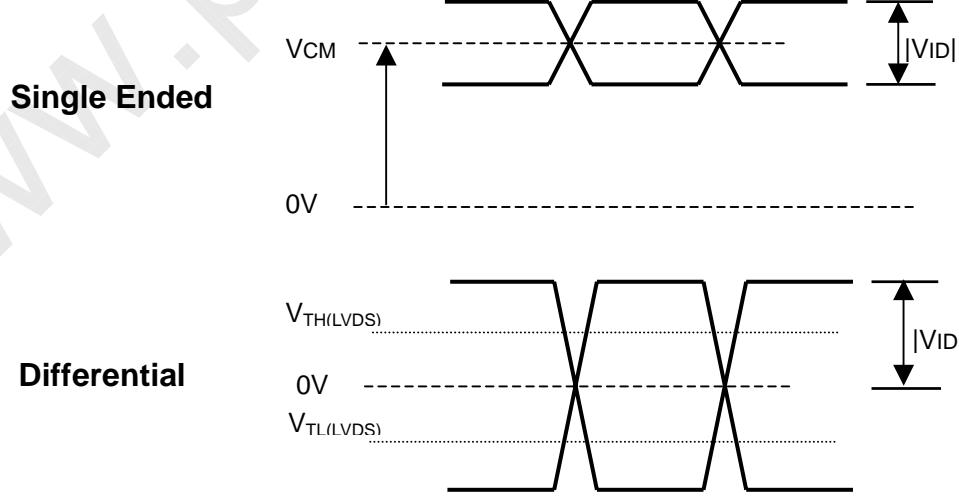


Active Area

Note (4) The specified power are the sum of LCD panel electronics input power and the inverter input power. Test conditions are as follows.

- (a) $V_{cc} = 3.3$ V, $T_a = 25 \pm 2$ °C, $f_v = 60$ Hz,
- (b) The pattern used is a black and white 32 x 36 checkerboard, slide #100 from the VESA file "Flat Panel Display Monitor Setup Patterns", FPDMSU.ppt.
- (c) Luminance: 60 nits.
- (d) The inverter used is provided from Sumida. Please contact them for detail information. CMO doesn't provide the inverter in this product.

Note (5) The parameters of LVDS signals are defined as the following figures.





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3.2 BACKLIGHT UNIT

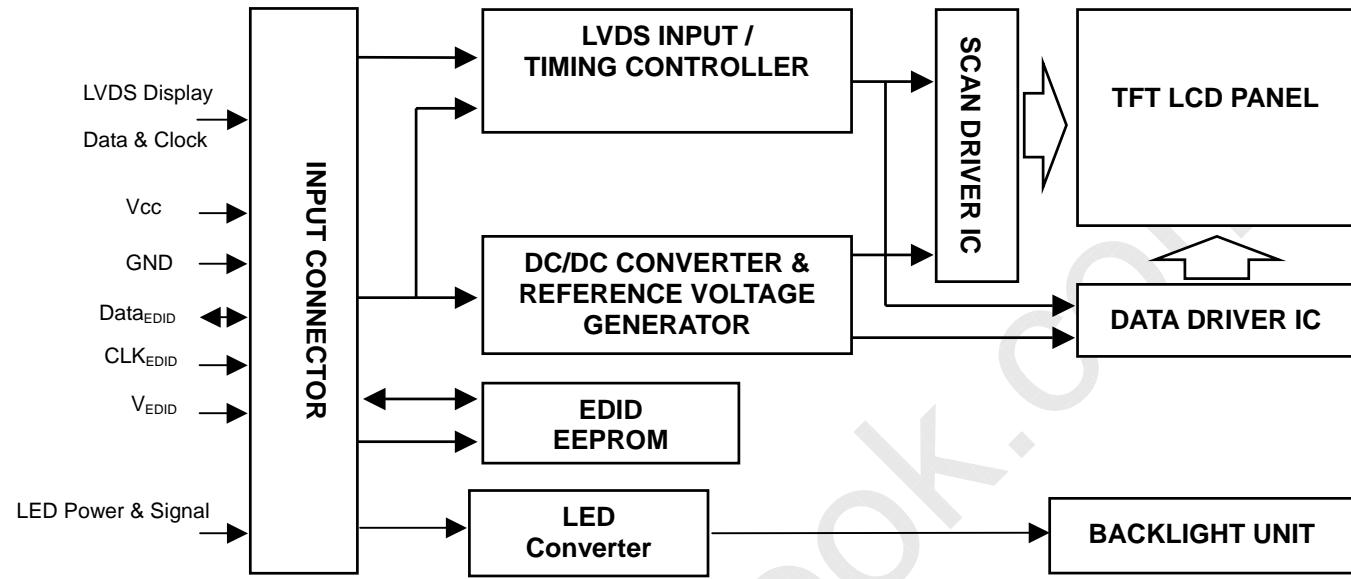
 $T_a = 25 \pm 2 \text{ }^{\circ}\text{C}$

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Life Time	L_{LED}	10000	-	-	Hrs	(1)

Note(1) The lifetime of LED is defined as the time when it continues to operate under the conditions at $T_a = 25 \pm 2 \text{ }^{\circ}\text{C}$ and $I_f = 16 \text{ mA}$ until the brightness becomes 50% of its original value.

4 BLOCK DIAGRAM

4.1 TFT LCD MODULE





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5 INPUT TERMINAL PIN ASSIGNMENT

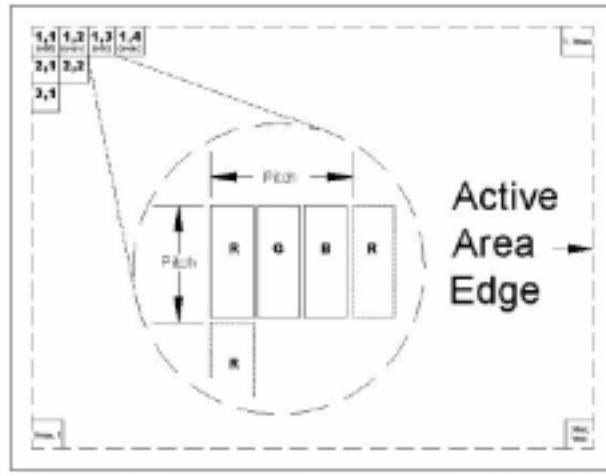
5.1 TFT LCD MODULE

Pin	Symbol	Description	Polarity	Remark
1	VSS	Ground		
2	CONNTEST	Connector test		
3	VDD	Logic power 3.3V (Panel logic, BL logic)		
4	VDD	Logic power 3.3V (Panel logic, BL logic)		
5	VDD	Logic power 3.3V (Panel logic, BL logic)		
6	VEDID	EDID 3.3V power		DDC 3.3V Power
7	TEST	Panel Self Test		
8	CLK	EDID clock		DDC Clock
9	DATA	EDID data		DDC Data
10	VSS	Ground (Panel logic, BL logic)		
11	VSS	Ground (Panel logic, BL logic)		
12	NC	no connect		
13	RINO-	- LVDS differential data input (R0-R5, G0)	Negative	R0~R5, G0
14	RINO+	+ LVDS differential data input (R0-R5, G0)	Positive	
15	VSS0	Ground-LVDS0		
16	RIN1-	- LVDS differential data input (G1-G5, B0-B1)	Negative	G1~G5, B0, B1
17	RIN1+	+ LVDS differential data input (G1-G5, B0-B1)	Positive	
18	VSS1	Ground-LVDS1		
19	RIN2-	- LVDS differential data input (B2-B5, HS, VS, DE)	Negative	B2~B5, DE, Hsync, Vsync
20	RIN2+	+ LVDS differential data input (B2-B5, HS, VS, DE)	Positive	
21	VSS2	Ground-LVDS2		
22	CLK-	- LVDS differential clock input		LVDS Level Clock
23	CLK+	+ LVDS differential clock input		
24	VSS3	Ground-LVDS3		
25	INV_PWM / R_PWM	PWM brightness control / Red PWM		
26	NC	no connect		
27	VSS	LED Ground		
28	VSS	LED Ground		
29	VSS	LED Ground		
30	VSS	LED Ground		
31	NC	no connect		
32	VBL+	7V - 20V LED power		
33	VBL+	7V - 20V LED power		
34	VBL+	7V - 20V LED power		
35	VBL+	7V - 20V LED power		
36	VBL+	7V - 20V LED power		
37	CONNTEST	Connector test		
38	Reserved	Green PWM / etc. (SMBus Clk for Dell)		
39	Reserved	Blue PWM / etc. (SMBus Data for Dell)		
40	VSS	Ground		

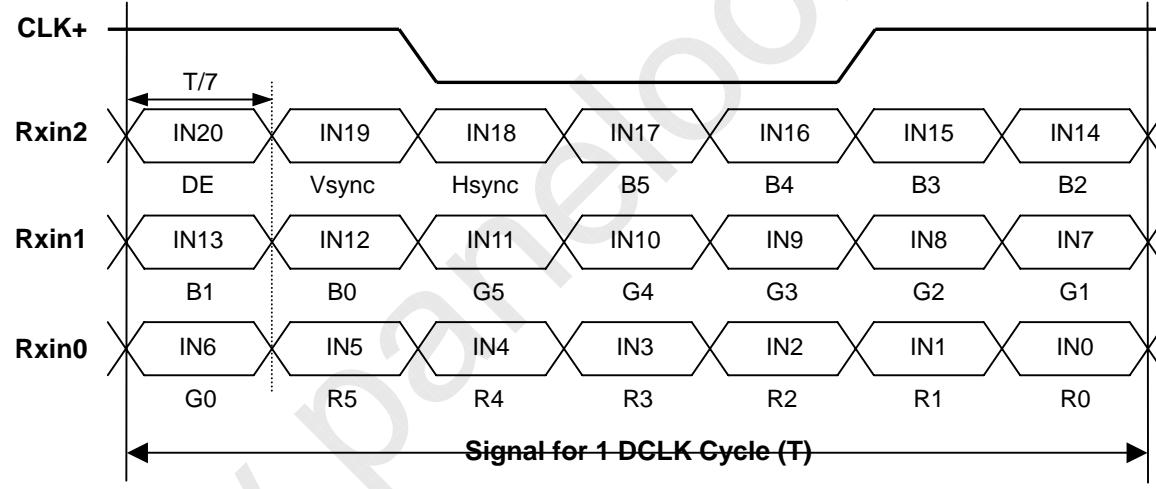
Note (1) Connector Part No.: I-PEX 20347-140E-02 or equivalent

Note (2) User's connector Part No: I-PEX 20345-*40T or equivalent

Note (3) The first pixel is odd as shown in the following figure.



5.2 TIMING DIAGRAM OF LVDS INPUT SIGNAL





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5.3 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																			
		Red						Green						Blue							
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0		
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0)/Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

5.4 EDID DATA STRUCTURE

The EDID (Extended Display Identification Data) data formats are to support displays as defined in the VESA Plug & Display and FPDI standards.

Byte # (decimal)	Byte # (hex)	Field Name and Comments	Value (hex)	Value (binary)
0	0	Header	00	00000000
1	1	Header	FF	11111111
2	2	Header	FF	11111111
3	3	Header	FF	11111111
4	4	Header	FF	11111111
5	5	Header	FF	11111111
6	6	Header	FF	11111111
7	7	Header	00	00000000
8	8	EISA ID manufacturer name ("CMO")	0D	00001101
9	9	EISA ID manufacturer name (Compressed ASCII)	AF	10101111
10	0A	ID product code (N133I5-L01)	09	00001001
11	0B	ID product code (hex LSB first; N133I5-L01)	13	00010011
12	0C	ID S/N (fixed "0")	00	00000000
13	0D	ID S/N (fixed "0")	00	00000000
14	0E	ID S/N (fixed "0")	00	00000000
15	0F	ID S/N (fixed "0")	00	00000000
16	10	Week of manufacture (fixed "00H")	00	00000000
17	11	Year of manufacture (fixed "00H")	00	00000000
18	12	EDID structure version # ("1")	01	00000001
19	13	EDID revision # ("3")	03	00000011
20	14	Video I/P definition ("digital")	80	10000000
21	15	Max H image size ("29cm")	1D	00011101
22	16	Max V image size ("18cm")	12	00010010
23	17	Display Gamma (Gamma = "2.2")	78	01111000
24	18	Feature support ("Active off, RGB Color")	0A	00001010
25	19	Red/Green (Rx1, Rx0, Ry1, Ry0, Gx1, Gx0, Gy1, Gy0)	31	00110001
26	1A	Blue/White (Bx1, Bx0, By1, By0, Wx1, Wx0, Wy1, Wy0)	35	00110101
27	1B	Red-x (Rx = "0.613")	9D	10011101
28	1C	Red-y (Ry = "0.358")	5B	01011011
29	1D	Green-x (Gx = "0.363")	5D	01011101
30	1E	Green-y (Gy = "0.544")	8B	10001011
31	1F	Blue-x (Bx = "0.156")	28	00101000
32	20	Blue-y (By = "0.144")	24	00100100
33	21	White-x (Wx = "0.313")	50	01010000
34	22	White-y (Wy = "0.329")	54	01010100
35	23	Established timings 1	00	00000000
36	24	Established timings 2 (1280*800@60Hz)	00	00000000
37	25	Manufacturer's reserved timings	00	00000000
38	26	Standard timing ID # 1	01	00000001
39	27	Standard timing ID # 1	01	00000001
40	28	Standard timing ID # 2	01	00000001
41	29	Standard timing ID # 2	01	00000001

42	2A	Standard timing ID # 3	01	00000001
43	2B	Standard timing ID # 3	01	00000001
44	2C	Standard timing ID # 4	01	00000001
45	2D	Standard timing ID # 4	01	00000001
46	2E	Standard timing ID # 5	01	00000001
47	2F	Standard timing ID # 5	01	00000001
48	30	Standard timing ID # 6	01	00000001
49	31	Standard timing ID # 6	01	00000001
50	32	Standard timing ID # 7	01	00000001
51	33	Standard timing ID # 7	01	00000001
52	34	Standard timing ID # 8	01	00000001
53	35	Standard timing ID # 8	01	00000001
54	36	Detailed timing description # 1 Pixel clock ("71.53MHz", According to VESA CTV Rev1.1)	F1	11110001
55	37	# 1 Pixel clock (hex LSB first)	1B	00011011
56	38	# 1 H active ("1280")	00	00000000
57	39	# 1 H blank ("167")	A7	10100111
58	3A	# 1 H active : H blank ("1280 : 167")	50	01010000
59	3B	# 1 V active ("800")	20	00100000
60	3C	# 1 V blank ("24")	18	00011000
61	3D	# 1 V active : V blank ("800 :24")	30	00110000
62	3E	# 1 H sync offset ("50")	32	00110010
63	3F	# 1 H sync pulse width ("33")	21	00100001
64	40	# 1 V sync offset : V sync pulse width ("3 : 6")	36	00110110
65	41	# 1 H sync offset : H sync pulse width : V sync offset : V sync width ("50: 33 : 3 : 6")	00	00000000
66	42	# 1 H image size ("286 mm")	1E	00011110
67	43	# 1 V image size ("179 mm")	B3	10110011
68	44	# 1 H image size : V image size ("286 : 179")	10	00010000
69	45	# 1 H boarder ("0")	00	00000000
70	46	# 1 V boarder ("0")	00	00000000
71	47	# 1 Non-interlaced, Normal, no stereo, Separate sync, H/V pol Negatives	1A	00011010
72	48	Detailed timing description # 2 Pixel clock ("71.53 MHz", According to VESA CTV Rev1.1)	F1	11110001
73	49	# 2 Pixel clock (hex LSB first)	1B	00011011
74	4A	# 2 H active ("1280")	00	00000000
75	4B	# 2 H blank ("167")	A7	10100111
76	4C	# 2 H active : H blank ("1280 : 167")	50	01010000
77	4D	# 2 V active ("800")	20	00100000
78	4E	# 2 V blank ("24")	18	00011000
79	4F	# 2 V active : V blank ("800 : 24")	30	00110000
80	50	# 2 H sync offset ("50")	32	00110010
81	51	# 2 H sync pulse width ("33")	21	00100001
82	52	# 2 V sync offset : V sync pulse width ("3 : 6")	36	00110110
83	53	# 2 H sync offset : H sync pulse width : V sync offset : V sync width ("50 : 33 : 3 : 6")	00	00000000
84	54	# 2 H image size ("286 mm")	1E	00011110
85	55	# 2 V image size ("179 mm")	B3	10110011

86	56	# 2 H image size : V image size ("286 : 179")	10	00010000
87	57	# 2 H boarder ("0")	00	00000000
88	58	# 2 V boarder ("0")	00	00000000
89	59	Module "A" Revision = Example: 00, 01, 02, 03, etc.	1A	00011010
90	5A	Detailed timing description # 3	00	00000000
91	5B	# 3 Flag	00	00000000
92	5C	# 3 Reserved	00	00000000
93	5D	# 3 FE (hex) defines ASCII string (Model Name "N133I5", ASCII)	FE	11111110
94	5E	# 3 Flag	00	00000000
95	5F	# Dell P/N "MC196" 1st character ("G")	47	01000111
96	60	# Dell P/N " MC196" 1st character ("R")	52	01010010
97	61	# Dell P/N " MC196" 1st character ("5")	35	00110101
98	62	# Dell P/N " MC196" 1st character ("4")	34	00110100
99	63	# Dell P/N " MC196" 1st character ("9")	39	00111001
100	64	LCD Supplier EEDID Revision #: "2"	32	00110010
101	65	Manufacturer P/N ("N")	4E	01001110
102	66	Manufacturer P/N ("1")	31	00110001
103	67	Manufacturer P/N ("3")	33	00110011
104	68	Manufacturer P/N ("3")	33	00110011
105	69	Manufacturer P/N ("I")	49	01001001
106	6A	Manufacturer P/N ("5")	35	00110101
107	6B	Manufacturer P/N (If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	0A	00001010
108	6C	Flag	00	00000000
109	6D	Flag	00	00000000
110	6E	Flag	00	00000000
111	6F	Data Type Tag:	FE	11111110
112	70	Flag	00	00000000
113	71	SMBUS value @ 10 [cd/m2]=7	07	00000111
114	72	SMBUS value @ 17 [cd/m2]=11	0B	00001011
115	73	SMBUS value @ 24 [cd/m2]=15	0F	00001111
116	74	SMBUS value @ 30 [cd/m2]=18	12	00010010
117	75	SMBUS value @ 60 [cd/m2]=34	22	00100010
118	76	SMBUS value @ 120 [cd/m2]=66	42	01000010
119	77	SMBUS value @ 190 [cd/m2]=105	69	01101001
120	78	SMBUS value @ 300 [cd/m2]=200	C8	11001000
121	79	Numbers of LVDS Recevier chip = 1	01	00000001
122	7A	BIST Enable: Yes = '01' No = '00' ("Yes")	01	00000001
123	7B	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	0A	00001010
124	7C	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
125	7D	(If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)	20	00100000
126	7E	Extension flag	00	00000000
127	7F	Checksum	EB	11101011

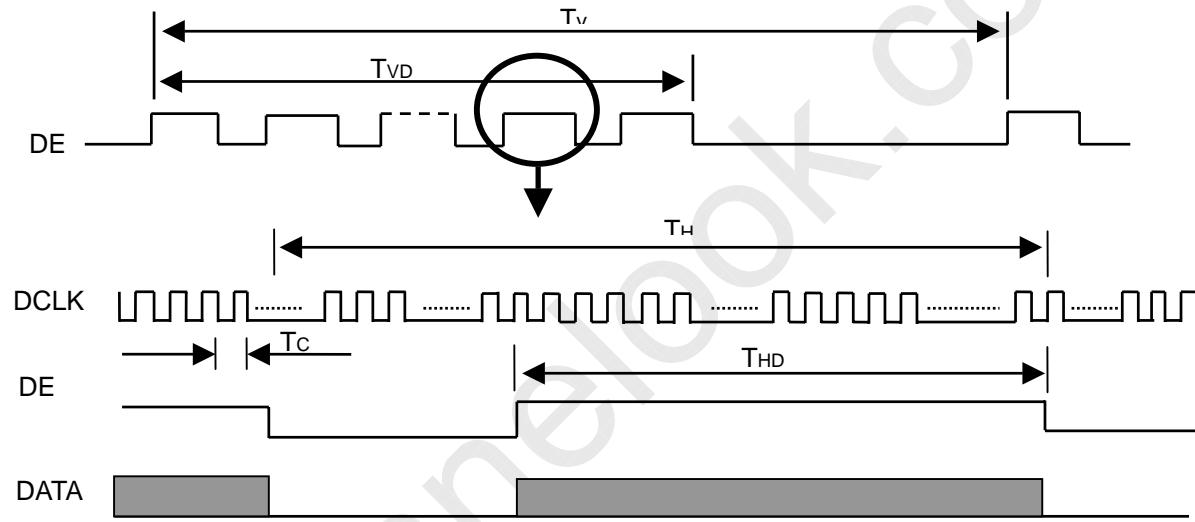
6 INTERFACE TIMING

6.1 INPUT SIGNAL TIMING SPECIFICATIONS

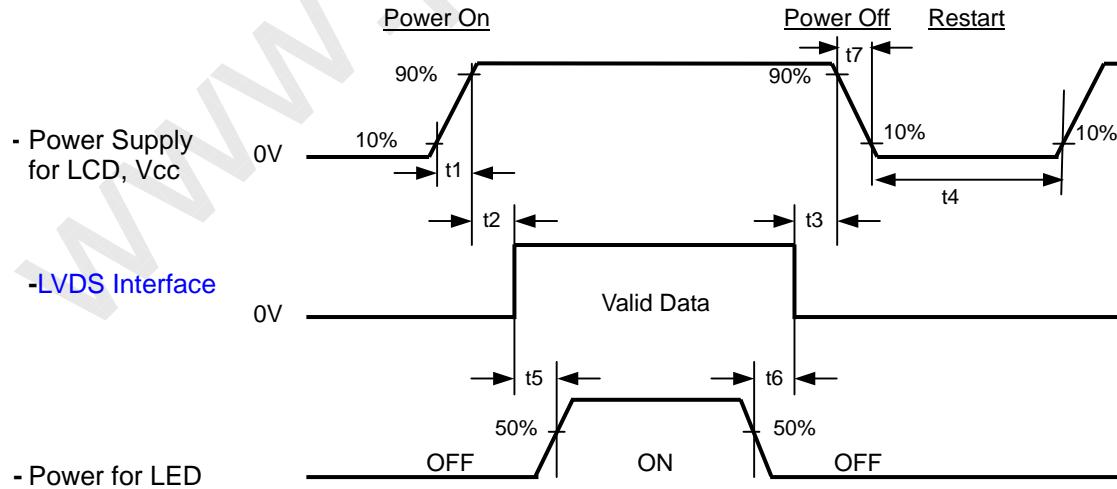
The specifications of input signal timing are as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	1/Tc	50	71.53	80	MHz	-
DE	Vertical Total Time	TV	810	823	2000	TH	-
	Vertical Addressing Time	TVD	800	800	800	TH	-
	Horizontal Total Time	TH	1360	1440	1900	Tc	-
	Horizontal Addressing Time	THD	1280	1280	1280	Tc	-

INPUT SIGNAL TIMING DIAGRAM



6.2 POWER ON/OFF SEQUENCE



**Approval****Timing Specifications:**

0.5 < t1 10 msec

0 < t2 50 msec

0 < t3 50 msec

t4 500 msec

t5 200 msec

t6 200 msec

Note (1) Please avoid floating state of interface signal at invalid period.

Note (2) When the interface signal is invalid, be sure to pull down the power supply of LCD Vcc to 0 V.

Note (3) The Backlight inverter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight inverter power must be turned off before the power supply for the logic and the interface signal is invalid.

Note (4) Sometimes some slight noise shows when LCD is turned off (even backlight is already off). To avoid this phenomenon, we suggest that the Vcc falling time had better to follow

t7 5 msec



Approval

7 OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

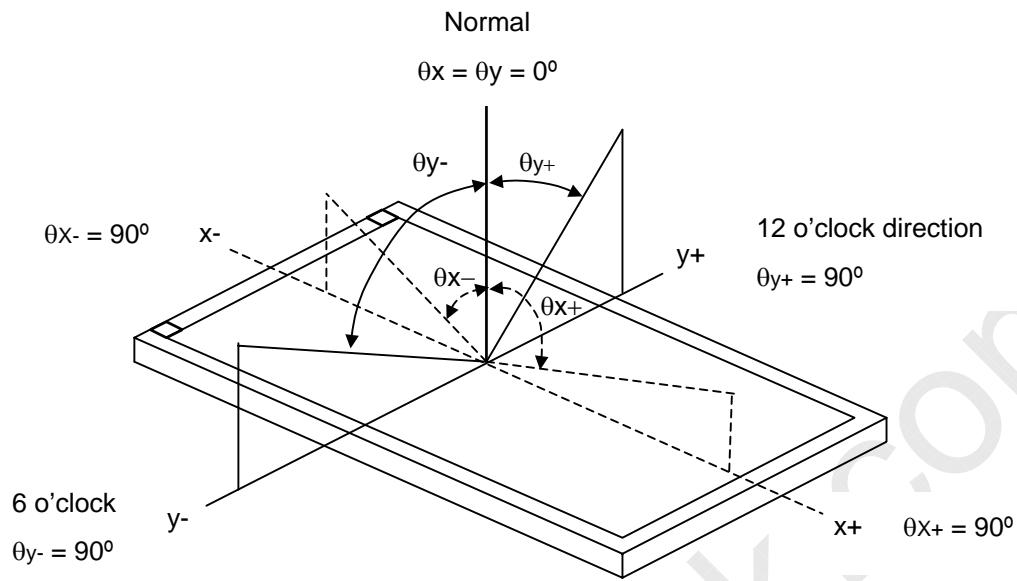
Item	Symbol	Value	Unit
Ambient Temperature	T _a	25±2	°C
Ambient Humidity	H _a	50±10	%RH
Supply Voltage	V _{CC}	3.3	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
Converter Current	I _f	20	mA / EA

The measurement methods of optical characteristics are shown in Section 7.2. The following items should be measured under the test conditions described in Section 7.1 and stable environment shown in Note (6).

7.2 OPTICAL SPECIFICATIONS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note			
Contrast Ratio	CR	$\theta_x=0^\circ, \theta_y=0^\circ$ Viewing Normal Angle	500	600		-	(2), (5)			
Response Time	T _R		-	6	11	ms	(3)			
	T _F		-	14	19	ms				
Average Luminance of White	L _{5p}		319	382		cd/m ²	(4), (5)			
Luminance Non-Uniformity	δW_{5p}		-	-	20	%	(5), (6)			
	δW_{13p}		-	-	35	%				
Color Gamut	C.G		42	45	-	%	(5), (7)			
Color Chromaticity	Red		TYP -0.06	0.613		-	(1), (5)			
				0.358		-				
	Green			0.354		-				
				0.548		-				
	Blue			0.152		-				
				0.145		-				
	White			0.313		-				
Viewing Angle	Horizontal	CR≥10		0.329		-	(1), (5)			
				50	60					
	Vertical			50	60					
				40	50					
				50	60					
				Deg.						

Note (1) Definition of Viewing Angle (θ_x, θ_y):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

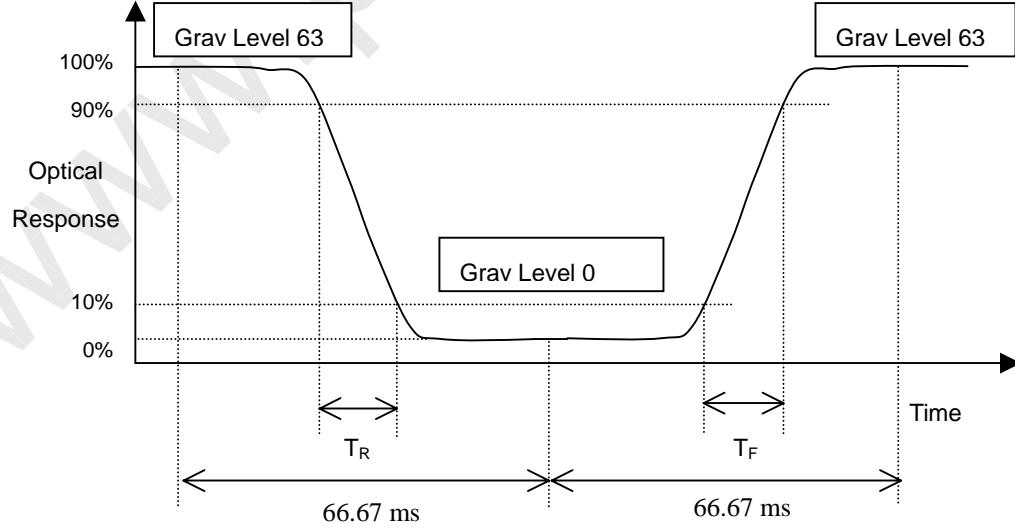
L_{63} : Luminance of gray level 63

L_0 : Luminance of gray level 0

$$CR = CR (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (T_R, T_F):



Note (4) Definition of Average Luminance of White (L_{5p}):

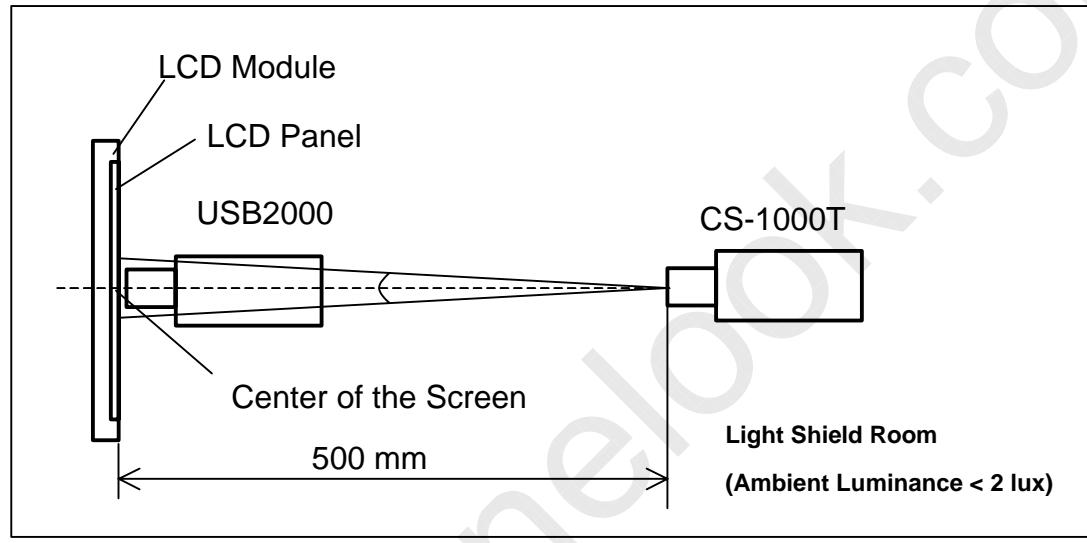
Measure the luminance of gray level 63 at 5 points

$$L_{5p} = [L(33) + L(37) + L(55) + L(73) + L(77)] / 5$$

$L(x)$ is corresponding to the luminance of the point X at Figure in Note (6)

Note (5) Measurement Setup:

The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

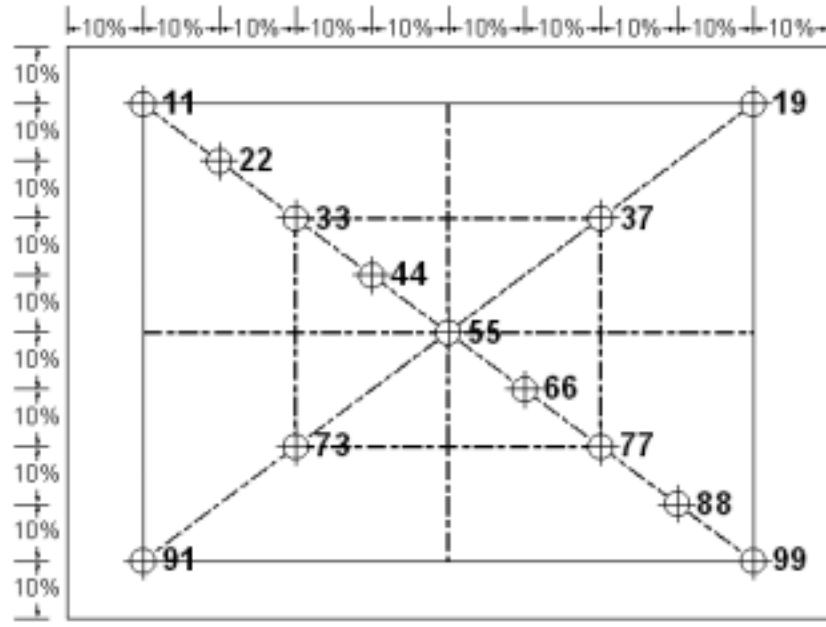


Note (6) Definition of White Variation (δW_{5p} , δW_{13p}):

Measure the luminance of gray level 63 at 5, 13 points

$$\delta W_{5p} = \{1 - \{ \text{Minimum } [L(33), L(37), L(55), L(73), L(77)] / \text{Maximum } [L(33), L(37), L(55), L(73), L(77)] \} \} * 100\%$$

$$\delta W_{13p} = \{1 - \{ \text{Minimum } [L(11) + L(22) + L(33) + L(44) + L(55) + L(66) + L(77) + L(88) + L(99) + L(19) + L(37) + L(73) + L(91)] / \text{Maximum } [L(11) + L(22) + L(33) + L(44) + L(55) + L(66) + L(77) + L(88) + L(99) + L(19) + L(37) + L(73) + L(91)] \} \} * 100\%$$



Note (7) Definition of color gamut (C.G.):

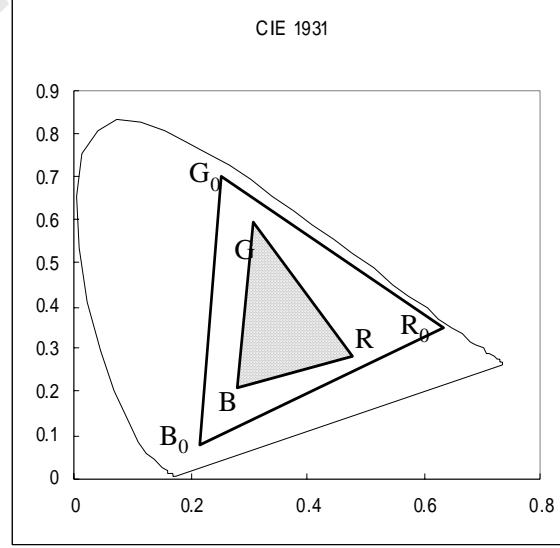
$$C.G. = \Delta R G B / \Delta R_0 G_0 B_0 * 100\%$$

R_0, G_0, B_0 : color coordinates of red, green, and blue defined by NTSC, respectively.

R, G, B : color coordinates of module on 63 gray levels of red, green, and blue, respectively.

$\Delta R_0 G_0 B_0$: area of triangle defined by R_0, G_0, B_0

$\Delta R G B$: area of triangle defined by R, G, B



8 PRECAUTIONS

8.1 HANDLING PRECAUTIONS

- (1) The module should be assembled into the system firmly by using every mounting hole. Be careful not to twist or bend the module.
- (2) While assembling or installing modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.
- (3) Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (4) Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily scratched.
- (5) If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.
- (6) Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static electricity, it may cause damage to the C-MOS Gate Array IC.
- (9) Do not disassemble the module.
- (10) Do not pull or fold the LED wire.
- (11) Pins of I/F connector should not be touched directly with bare hands.

8.2 STORAGE PRECAUTIONS

- (1) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
- (2) It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.
- (3) It may reduce the display quality if the ambient temperature is lower than 10 °C. For example, the response time will become slowly, and the starting voltage of LED will be higher than the room temperature.

8.3 OPERATION PRECAUTIONS

- (1) Do not pull the I/F connector in or out while the module is operating.
- (2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.
- (3) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with inverter. Do not disassemble the module or insert anything into the Backlight unit.

9 PACKAGING

9.1 CARTON

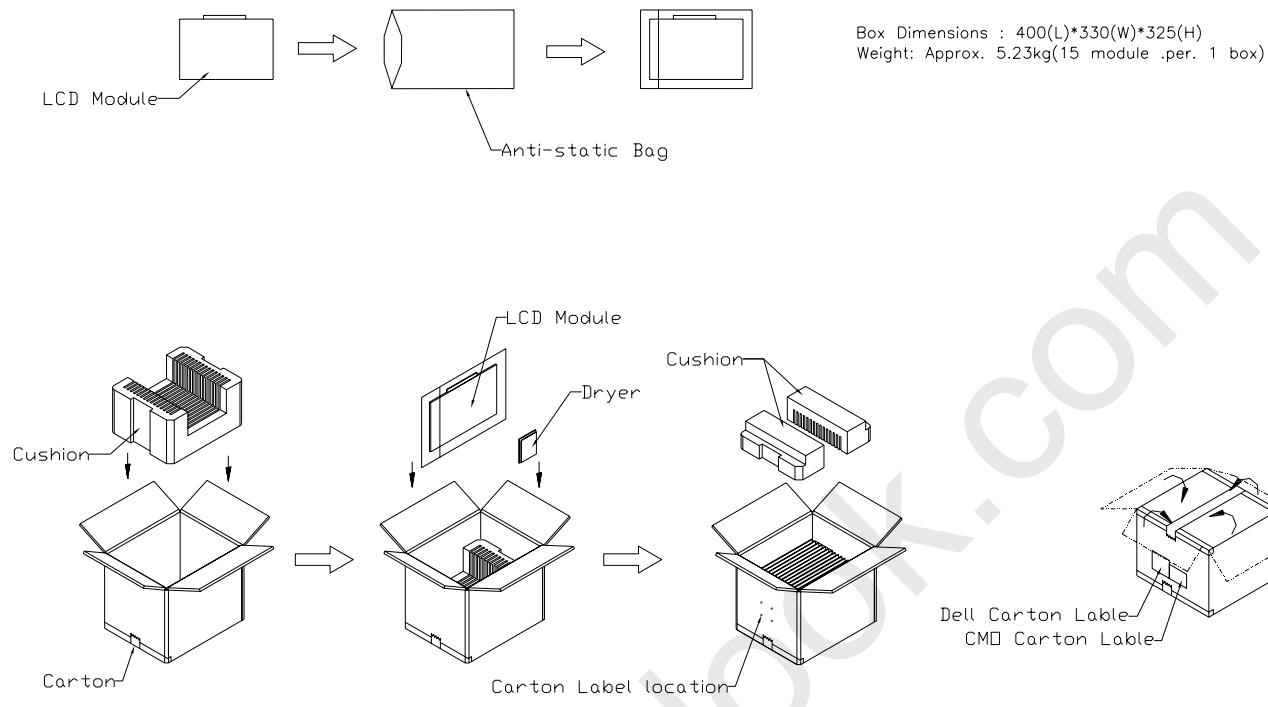
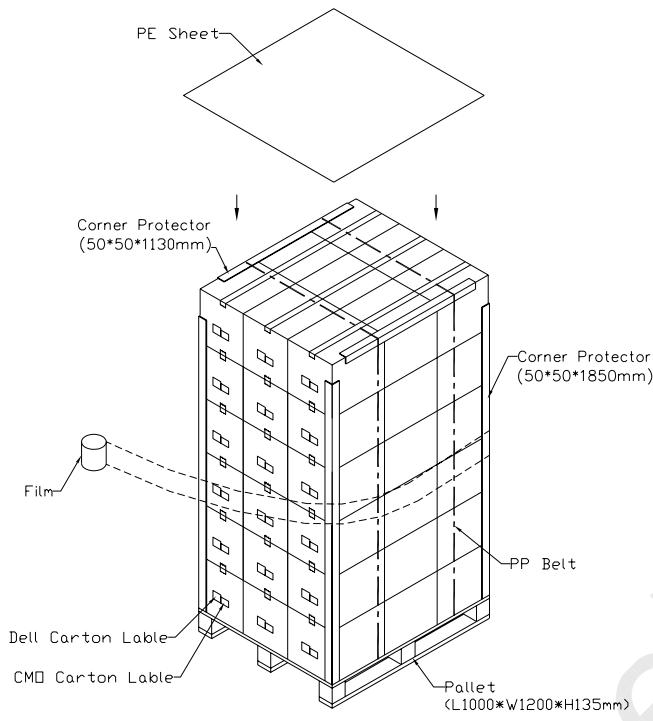


Figure. 9-1 Packing method

9.2 PALLET

For Sea freight shipping drawing



For Air freight shipping drawing

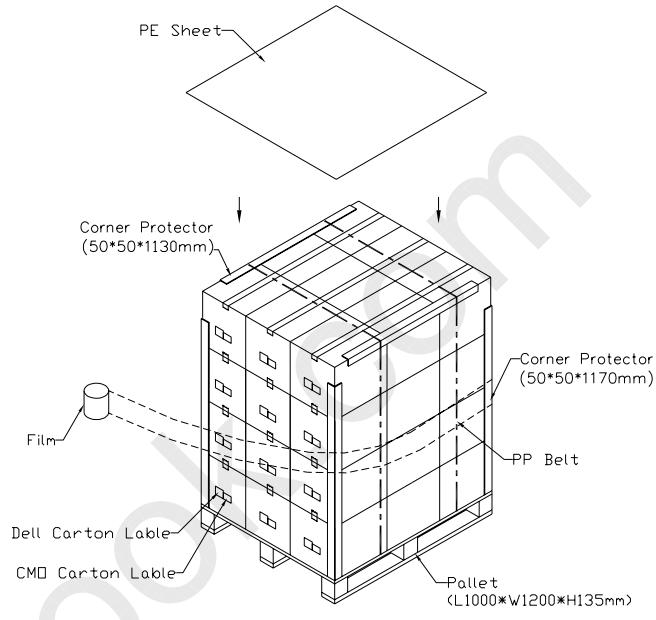


Figure. 9-2 Packing method



10 DEFINITION OF LABELS

10.1 CMO MODULE LABEL

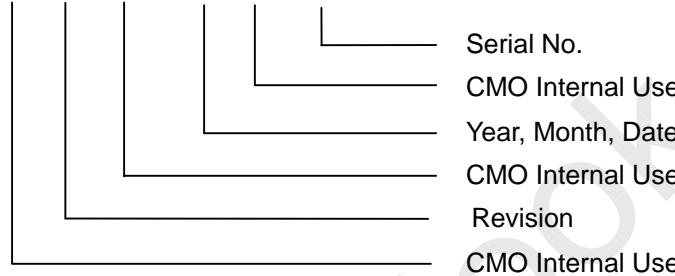
The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



(a) Model Name: N133I5 - L01

(b) Revision: Rev. XX, for example: A1, ..., C1, C2 ...etc.

(c) Serial ID: X X X X X X X Y M D X N N N N



(d) Production Location: MADE IN XXXX. XXXX stands for production location.

(e) UL/CB logo: "LEOO" especially stands for panel manufactured by CMO Ningbo satisfying UL/CB requirement. "LEOO" is the CMO's UL factory code for Ningbo factory.

Serial ID includes the information as below:

(a) Manufactured Date: Year: 1~9, for 2001~2009

Month: 1~9, A~C, for Jan. ~ Dec.

Day: 1~9, A~Y, for 1st to 31st, exclude I, O and U

(b) Revision Code: cover all the change

(c) Serial No.: Manufacturing sequence of product

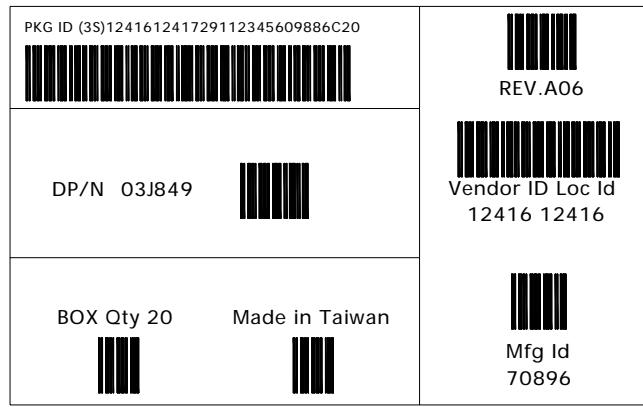
10.2 CMO CARTON LABEL



(a) Production location: Made In XXXX. XXXX stands for production location.



10.3 CARTON LABEL



Type J Label

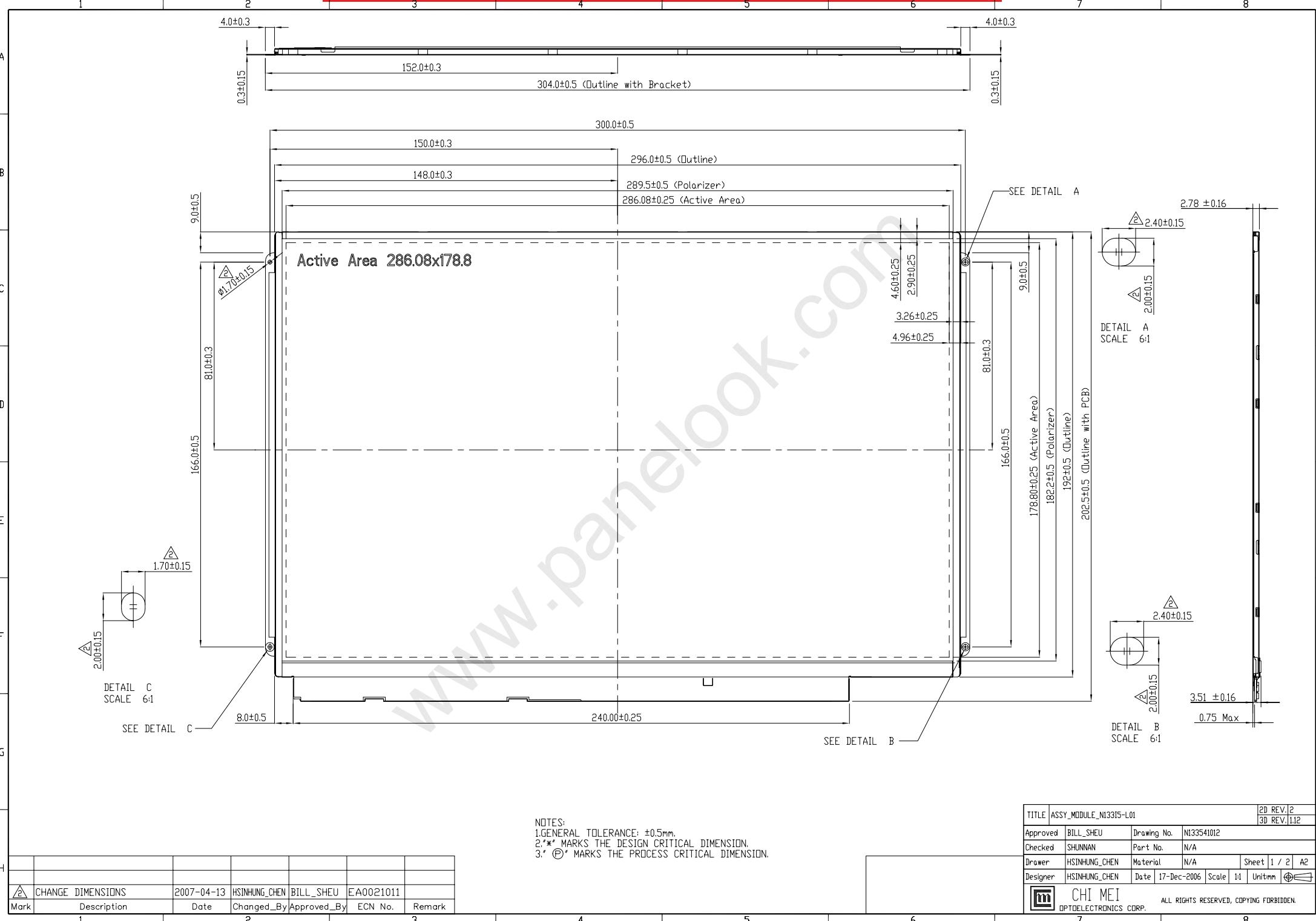
- Verdana font or equivalent,bold
- 20pt.-all fields
- 203 DPI printer minimum
- Code 128B
- 10-15 mil minimum narrow bar
- .75"minimum barcode height
- .10" or greater quiet zone
- 4.0" x 6.0" label size
- Brady THT -25-402-1 or equivalent
- Brady R6107 series ribbon or equivalent

10.4 PALLET LABEL



Type K Label

- Verdana font or equivalent,bold
- 12pt.-all descript fields
- 10pt.-all data fields
- 203 DPI printer minimum
- Code 128B
- 10 mil minimum narrow bar
- .30-,50"minimum barcode height
- .10" or greater quiet zone
- 4.0" x 6.5" label size
- Brady THT -78-402-.9 or equivalent
- Brady R6107 series ribbon or equivalent



NOTES:
 1. GENERAL TOLERANCE: ±0.5mm.
 2. * MARKS THE DESIGN CRITICAL DIMENSION.
 3. (◎) MARKS THE PROCESS CRITICAL DIMENSION.

CHANGE DIMENSIONS	2007-04-13	HSINHUNG_CHEN	BILL_SHEU	EA0021011		
Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark
1	2	3	4	5	6	7

TITLE		ASSY_MODULE_NI3315-L01	2D REV. 2
		3D REV. 112	
Approved	BILL_SHEU	Drawing No.	NI33541012
Checked	SHUNNAN	Part No.	N/A
Drawer	HSINHUNG_CHEN	Material	N/A
Designer	HSINHUNG_CHEN	Date	17-Dec-2006
		Scale	1:1
		Unit/mm	◎

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